

Unit test Answers - PRACTICE

$$1a) (-7-3, (-8-(-1))) \\ (-10, -7)$$

$$b) |\vec{a}| = \sqrt{(-7)^2 + (-8)^2} \\ = \sqrt{113}$$

$$c) -7(-7, -8) + 9(3, -1) \\ (49, 56) + (27, -9) \\ (76, 47)$$

$$d) \vec{b} = 3\hat{i} - \hat{j}$$

$$e) \vec{a} \cdot \vec{b} = (-7)(3) + (-8)(-1) \\ = -21 + 8 \\ = -13$$

$$2a) \vec{ab} = (-2-(-3), -4-1, 10-2) \\ = (1, -5, 8)$$

$$b) \vec{a} \times \vec{b} = \begin{vmatrix} -3 & 1 & 2 & -3 & 1 & 2 \\ -2 & -4 & 10 & -2 & -4 & 10 \end{vmatrix} \\ = (10-(-8), -4-(-30), 12-(-2)) \\ = (18, 26, 14)$$

$$c) \cos \theta = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| |\vec{b}|} \\ = \frac{(-3)(-2) + (1)(-4) + (2)(10)}{(\sqrt{(-3)^2 + 1^2 + 2^2})(\sqrt{(-2)^2 + (-4)^2 + 10^2})} \\ = \frac{22}{(\sqrt{14})(\sqrt{120})} \\ = 0.5367 \\ \theta = 57.5^\circ$$

$$2d) 3a \cdot (2a - 5b)$$

$$= 3(-3, 1, 2) \cdot (2(-3, 1, 2) - 5(-2, -4, 10))$$

$$= (-9, 3, 6) \cdot (-6, 2, 4) - (-10, -20, 50)$$

$$= (-9, 3, 6) \cdot (4, 22, -46)$$

$$= (-9)(4) + 3(22) + 6(-46)$$

$$= -246$$

$$3a) \overline{AG}$$

$$b) \overline{HA}$$

$$c) \overline{AG}$$

$$d) \overline{\emptyset}$$

$$4) m(-1, -4, 1) + n(-4, -1, 4) = (2, -7, -2)$$

$$-m - 4n = 2 \quad (1)$$

$$-4m - n = -7 \quad (2)$$

$$m + 4n = -2 \quad (3)$$

$$m = -2 - 4n$$

$$-4(-2 - 4n) - n = -7$$

$$8 + 16n - n = -7$$

$$8 + 15n = -7$$

$$15n = -15$$

$$n = -1$$

$$LS: -2 - 4(-1)$$

$$RS$$

$$-2 + 4$$

$$= 2$$

$$2$$

$$LS = RS \quad \therefore \text{not collinear.}$$

$$n \cdot 1 = -2 - 4(-1)$$

$$= -2 + 4$$

$$= 2$$

$$5) u \cdot v = 0$$

$$3k + (-5)(2) = 0$$

$$3k - 10 = 0$$

$$3k = 10$$

$$k = \frac{10}{3}$$

$$6.) |\vec{p} \times \vec{q}|$$

$$\begin{vmatrix} 4 & -2 & -3 & 4 & -2 & -3 \\ 0 & 2 & 3 & 0 & 2 & 3 \end{vmatrix}$$

$$(-6 - (-6), 0 - 12, 8 - 0)$$

$$(0, -12, 8)$$

$$\begin{aligned} |\vec{p} \times \vec{q}| &= \sqrt{0^2 + (-12)^2 + 8^2} \\ &= \sqrt{0 + 144 + 64} \\ &= \sqrt{208} \\ &= 4\sqrt{13} \end{aligned}$$

$$7.) \vec{m} = (7, -2, -1)$$

$$a) \vec{r} = (1, 4, -5) + t(7, -2, -1)$$

$$b) x = 1 + 7t \quad y = 4 - 2t \quad z = -5 - t$$

$$c) \frac{x-1}{7} = \frac{y-4}{-2} = \frac{z+5}{-1}$$

$$8) s \times t = \begin{vmatrix} 1 & 0 & 2 & 1 & 0 & 6 \\ -1 & 3 & 4 & -1 & 3 & 4 \end{vmatrix}$$

$$(0 - 6, -2 - 4, 3 - 0)$$

$$(-6, -6, 3)$$

$$-6x - 6y + 3z + D = 0$$

$$-6(1) - 6(2) + 3(-1) + D = 0$$

$$D = 6 + 12 + 3$$

$$D = 21$$

$$-6x - 6y + 3z + 21 = 0$$

$$9) x - 2s + 5t = 6$$

$$\text{Para: } \begin{cases} x = 2s - 5t + 6 \\ y = s \\ z = t \end{cases}$$

$$(x, y, z) = (2s - 5t + 6, s, t)$$

$$= (6, 0, 0) + (2s, s, 0) + (-5t, 0, t)$$

$$= (6, 0, 0) + s(2, 1, 0) + t(-5, 0, 1)$$

$$10.) \vec{n} = (2, 0, -3) \times (5, 1, -1)$$

$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 0 & -3 \\ 5 & 1 & -1 \end{vmatrix}$$

$$(0 - (-3), -2 - (-15), 2 - 0)$$

$$(3, -13, 2)$$

$$3x - 13y + 2z + D = 0$$

$$3(4) - 13(-3) + 2(5) + D = 0$$

$$12 + 39 + 10 + D = 0$$

$$D = -61$$

$$3x - 13y + 2z - 61 = 0$$

$$\vec{r} = (4, -3, 5) + s(5, 1, -1) + t(2, 0, -3)$$